REMARKS/ARGUMENTS

The Examiner has objected to the drawings and replacement drawings are enclosed with the amended sheets showing amendments highlighted for the Examiner's assistance in determining the amendments that have been effected. Thus, descriptive legends have been applied to Figure 1, corrections to the legends of boxes 28, 21 and 27 have been made to Figure 2. Also in Figure 2 reference numeral ---12-- has been added. Reference numerals have been added to Figure 7, and legends have been added to Figure 10. Also in Figure 10 reference numeral "101" has been corrected to --100--.

The Examiner has objected to the specification as lacking headings and correction has been effected. Concerning the paragraph 8 objection, amendment has been effected except to page 12 where "memory 102" has been corrected to --the pre-distorter RAM--, the pre-distorter RAM being referred to at page 11, line 28.

The Examiner has raised objections to the claims in paragraphs 9-13 of the Office Action but these objections are now moot in view of the amended claims now filed.

Objection has been made to the claims originally filed under 35 USC § 102 and it was argued that claims 1-4 and 12-15 were anticipated by Blauvelt.

The claims now filed more clearly distinguish the present invention from the cited art. The claims 26-44 now filed correspond with claims 1-19 that were added during the International phase of the subject application and the said claims were found by the International Examiner to have novelty and inventive step.

Claim 26 recites:

"A method of pre-distorting a signal of a satellite transmission link, said signal being modulated to carry symbols representative of digital data, so as to offset later distortion of the signal during transmission across the satellite transmission link, said link having root Nyquist bandpass filters in respective up and down links, the method including passing the signal through a cascade of identical pre-distorting stages, each of which generates an approximation of the required pre-distortion, each successive stage receiving the approximation from the preceding stage in an iterative fashion so that errors in successive approximations converge toward zero with increase in the

number of stages."

This claim is directed toward a method of pre-distorting a signal of a satellite transmission link. In distinction Blauvelt, as stated at column 1, lines 15-18, is directed toward "an electronic circuit for providing a linear output from an amplitude modulated transmission device such as a semiconductor laser". The entire disclosure of Blauvelt is directed toward correcting distortion of a laser.

Blauvelt uses conventional, well known, diode resistance inductance networks in separate sections to effect a correction intended for use with laser diodes in optical communication systems and for amplifying devices in wideband CATV systems. In this respect Blauvelt, at column 8, lines 15-24, teaches pre-distortion components A, B and C in series with distorter D in parallel with distorter B "with each contributing a real or imaginary component of distortion in selected frequency ranges, for example, which cumulatively produce a pre-distorted output signal...". Thus, Blauvelt teaches using several different stages to implement piece by piece the required amount of correction across the bandwidth and dynamic range of the system, each stage performing a part of the correction e.g. at different frequencies in the band, or different signal powers. In distinction, the present invention in claim 26 requires "passing the signal through a cascade of identical pre-distorting stages each of which generates an approximation of the required pre-distortion".

Blauvelt is unable to make a complete correction by successively approximating the required result because it is an additive, accumulative effect where each separate correction is recognisable and separable in the final result. Blauvelt's linearization of any particular device needs a selection of appropriate stages and then careful setting up adjustment of any tuned circuits and biasing of diodes and such components will need maintenance over a period of time. In the present invention, a number of identical stages using an interative process is used where each stage is identical to one another and is not different from one another as in Blauvelt. In the present invention, once a first stage is loaded with measured data concerning the device to be corrected, the successive stages will converge any error in approximation without any setting up or tuning. It is therefore inherently dynamic and adaptive.

Thus new claim 26 has clear novelty and non-obviousness in view of Blauvelt since Blauvelt is directed toward a different field, i.e. is not concerned with satellite

transmission links, and utilises distorters which are different from one another, whereas the subject invention utilises identical pre-distorting stages. The concept of having stages which receive an approximation from a preceding stage so that errors in successive approximations converge toward zero with increase in the number of stages is not remotely suggested by Blauvelt.

With regard the Examiner's comments concerning originally filed claims 3 and 4, the Examiner has taken Blauvelt's use of stage D as a static corrector with the other distorters, A, B, C, as dynamic correctors. With respect, this is a misunderstanding because the teaching of Blauvelt is of a wholly static correction that does not allow dynamic corrections to be effected and Blauvelt does not offer or describe any means whereby his teaching could be made adaptive or responsive to changes in operating conditions.

It is also assumed in the Office Action, at paragraph 15, line 4, and at page 9, line 2, that Blauvelt discloses a digital system. This is incorrect and the teaching of Blauvelt is clearly in the analog domain.

Similar comments apply mutatis mutandis to new claim 34 now filed.

Claims 27-33 and 35-45 are appended either directly or indirectly to the independent claims and so these claims are also allowable.

Objection was also made to claims 16, 21, 22 and 25 under U.S.C. 103(a) as being unpatentable over Blauvelt in view of Karam et al. It is submitted that this objection is now moot in view of the amendment made to the claims.

However, for completeness, Karam et al teaches a single pre-distortion stage connected between a filter and a modulator through the intermediary of a D to A converter and an analogue filter 13. The single stage of correction of Karam et al has a memory with a look-up table and operates in the sampled domain where an over-sampling mechanism is used to overcome the problem of intersymbol interference caused by band limiting. There is no disclosure in Karam et al of successive or proximation in an iterative fashion as required by the independent claims 26 and 34 now filed.

Additionally, the present invention does not start with a defined initial correction as is required by Karam et al but the present invention has a series of identical stages that take as inputs both the original signal and the previous correction output from a previous stage and there is then applied a feed-forward method to

compute a refined approximation. There is thus successive approximation in the present invention. The second signal and the original signal are used as inputs to the next, third, stage which is identical to the second stage and also produces a refined version of the correction signal. The iteration continued in the present invention for as many stages as are required to meet the correction criteria. In the present invention each stage in sequence makes reference the original uncorrected signal. This is not taught by Blauvelt or Karam et al.

It is additionally submitted that it is inappropriate to attempt to combine Blauvelt and Karam et al. Blauvelt operates in an analog form and Karam et al is operative in the digital domain. Even if Karam et al were combined with Blauvelt, the features of the present invention of providing a cascade of identical pre-distorting stages, each of which generates an approximation of the required pre-distortion, each successive stage receiving the approximation from the preceding stage in an iterative fashion, so that errors in successive approximations converge toward zero with increasing number of stages, is not taught or remotely suggested by the prior art, either taken alone or in combination.

The Examiner is therefore respectfully requested to reconsider the prior art objections and it is submitted that, as amended, this application is now in condition for allowance.

Respectfully submitted,

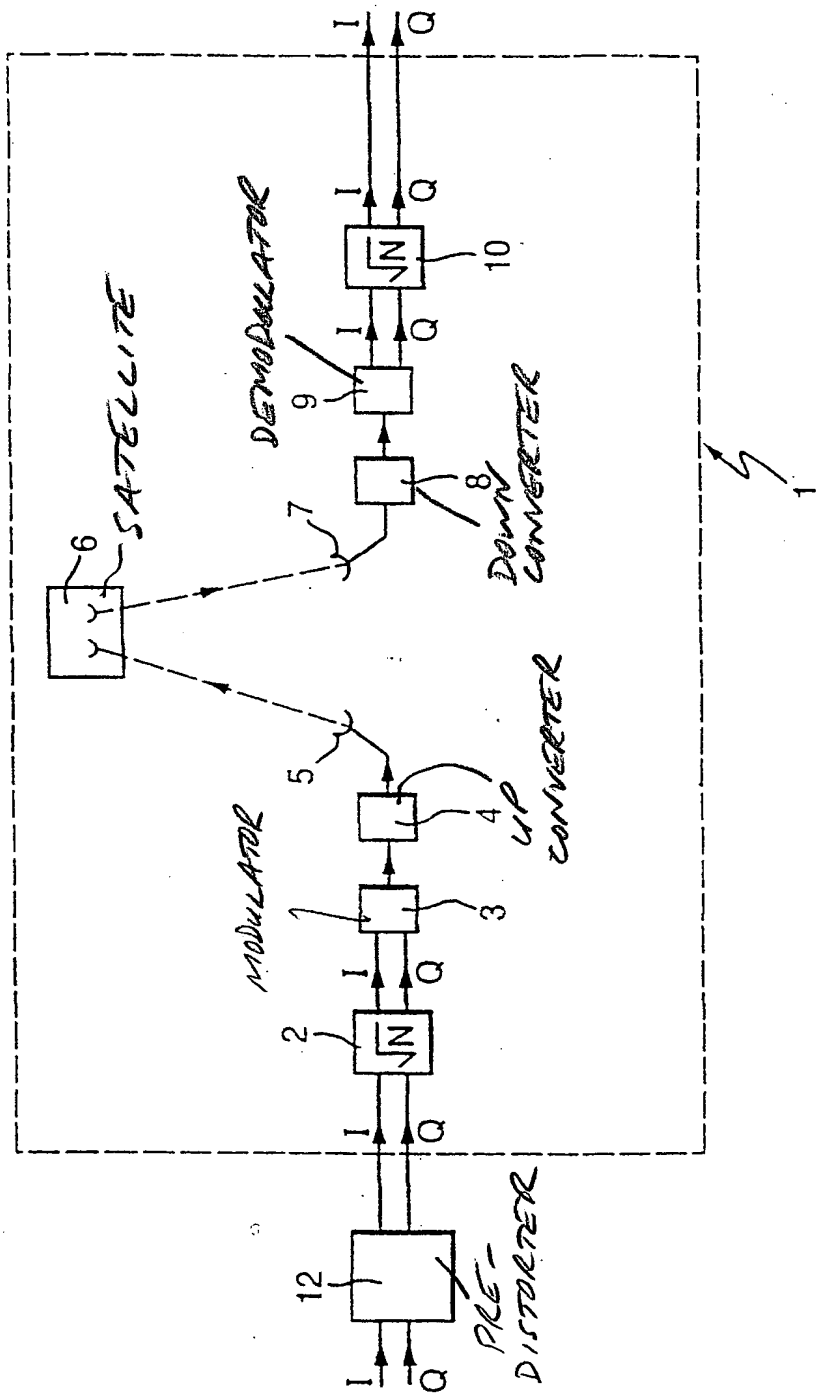
Date 12/10/04

Douglas S. Rupert
Registration No. 44,434

In the drawings

Amendments are made to the drawings and replacement drawing sheets 1, 2, 9 and 13 are enclosed which we request be substituted for the corresponding pages on file. The replacement pages include descriptive legends.

Fig.1.



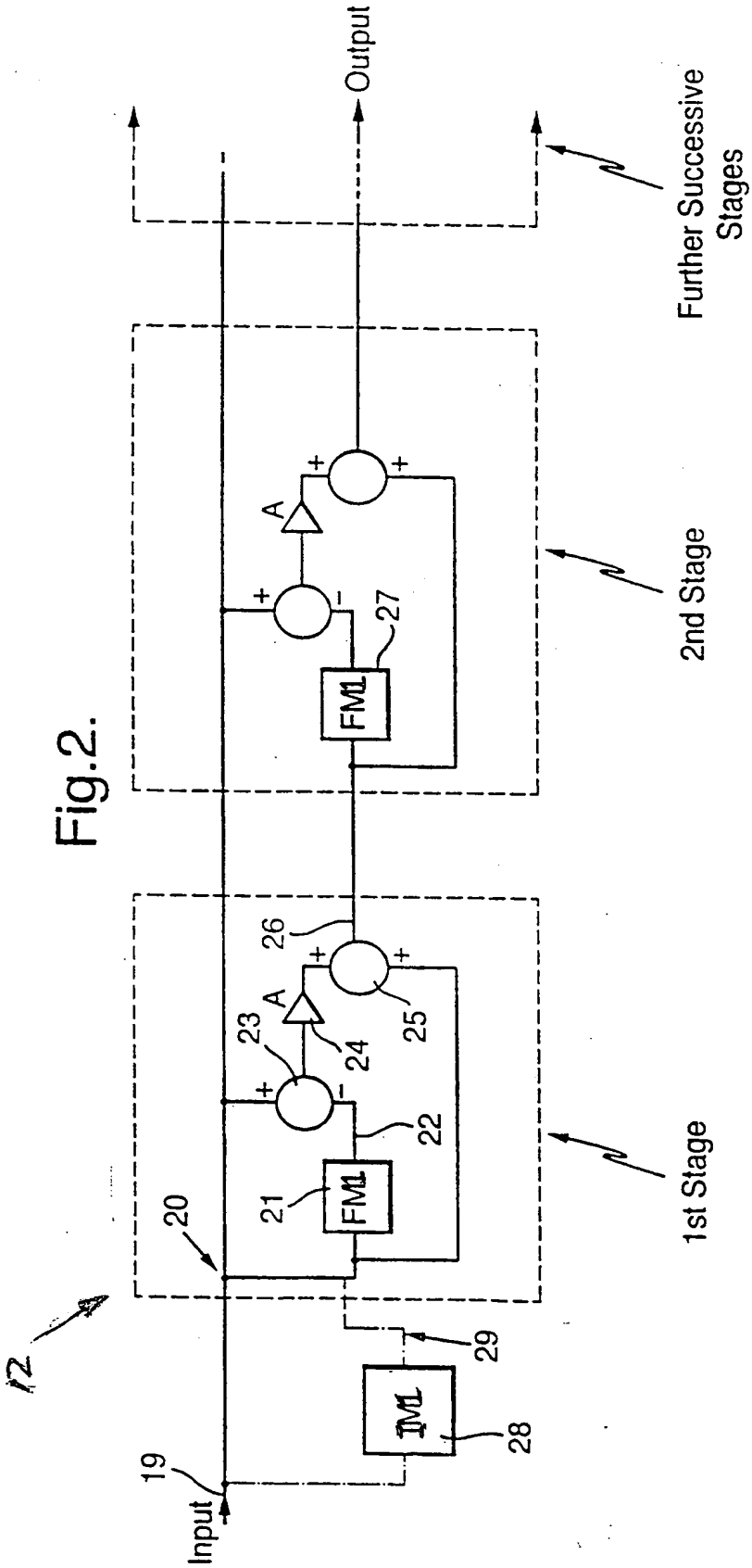

Output
Further Successive Stages
2nd Stage
1st Stage
Input
12
19
20
21
22
23
24
25
26
27
28
29
A
FM1

Fig.2.

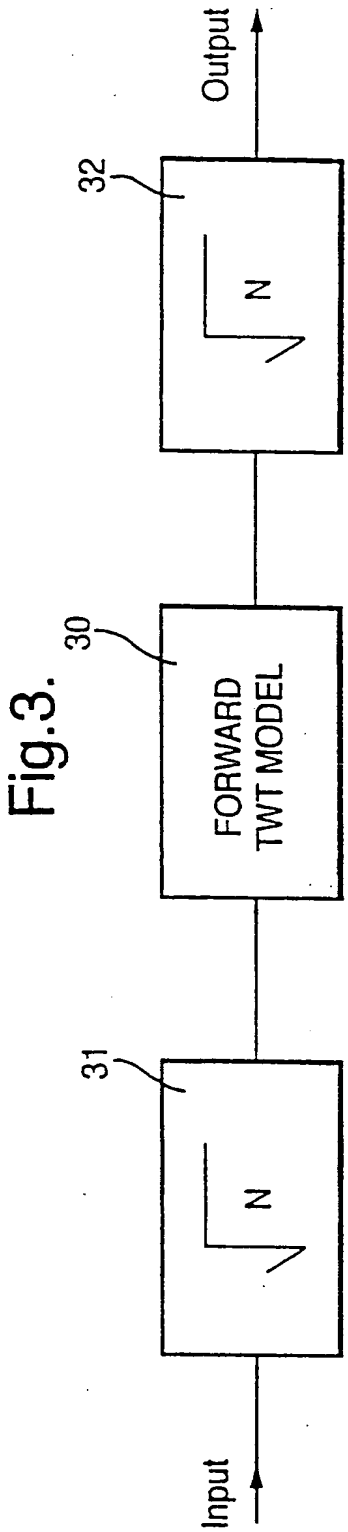

Output
32
N
30
FORWARD TWT MODEL
31
N
Input

Fig.3.

Fig.7.

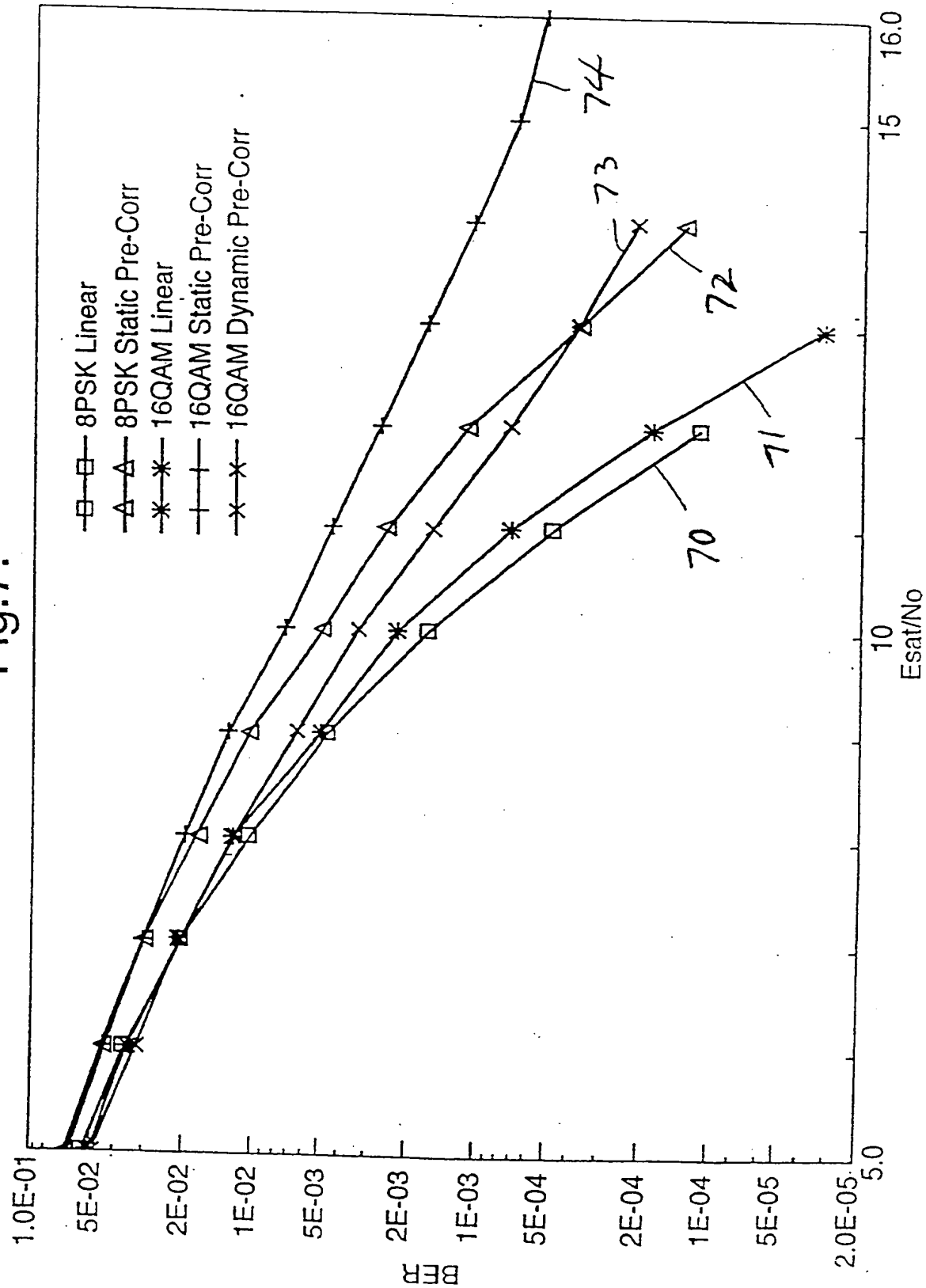
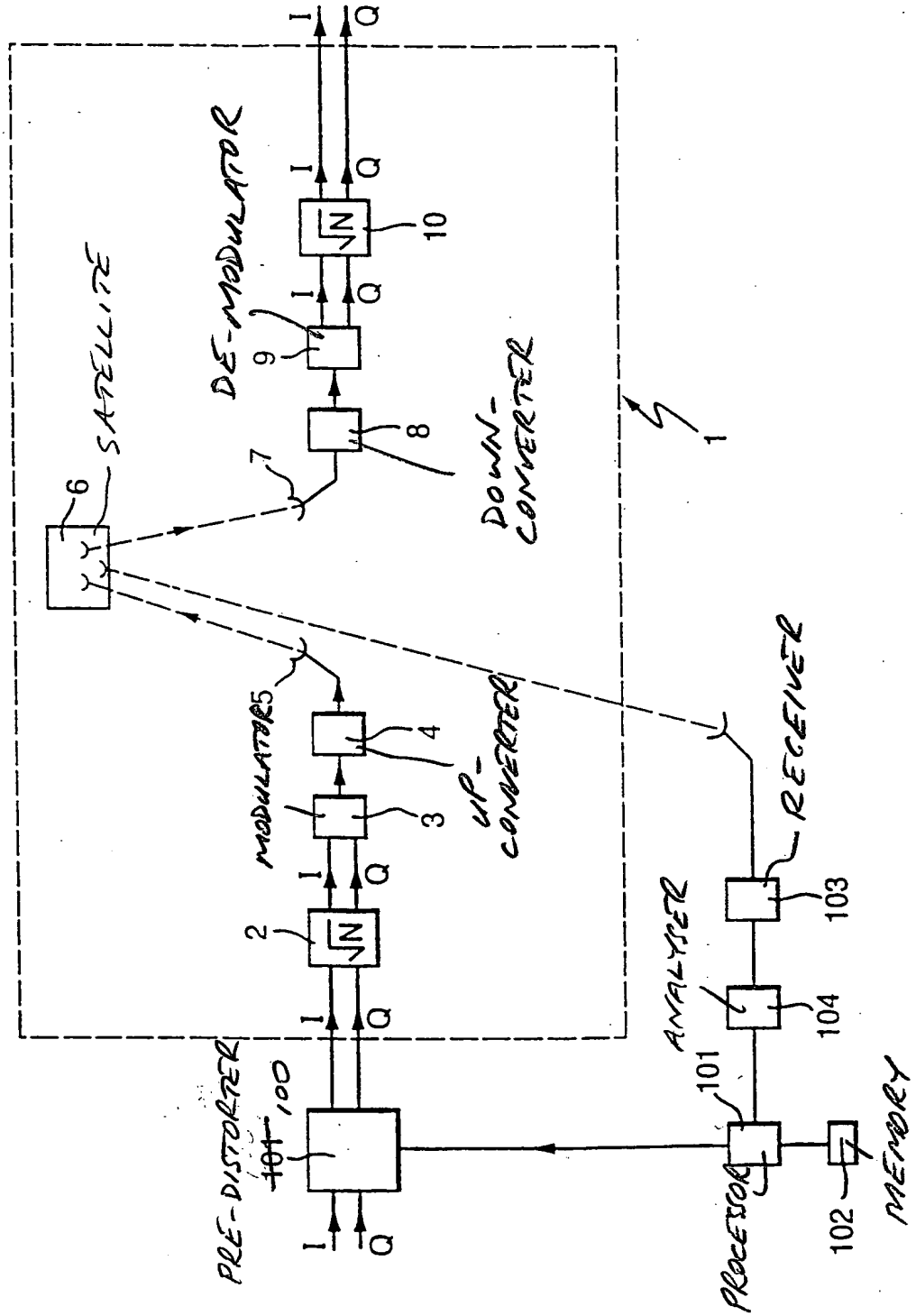

8PSK Linear
8PSK Static Pre-Corr
16QAM Linear
16QAM Static Pre-Corr
16QAM Dynamic Pre-Corr
BER
1.0E-01
5E-02
2E-02
1E-02
5E-03
2E-03
1E-03
5E-04
2E-04
1E-04
5E-05
2.0E-05
5.0
10
15
16.0
Esat/No
70
71
72
73
74

Fig.10.


I
Q
DE-MODULATOR
SATELLITE
DOWN-CONVERTER
UP-CONVERTER
MODULATOR
RECEIVER
ANALYSER
PRE-DISTORTER
PROCESSOR
MEMORY
1
2
3
4
5
6
7
8
9
10
100
101
102
103
104
N